The Human Footprint: Next Steps

Our maps of the human footprint represent preliminary models of the effects of land uses and developments over the western United States. We are testing the predictions and associated implications to better understand the human influence on shrubland ecosystems in the western United States. Specifically, our next steps include:

- **Testing how predators respond to the human footprint**

Our predictions from the model of avian predation risk were substantiated with independent data from the USGS Breeding Bird Surveys. However, we need to further test the model with additional surveys of avian as well as mammalian predators.

- **Investigating how species of conservation concern respond to the human footprint**

Greater Sage-grouse, Gunnison Sage-grouse (*Centrocercus minimus*), and pygmy rabbits (*Brachylagus idahoensis*) have been petitioned for protection under the Endangered Species Act. We need to better understand how the human footprint influences the distribution and abundance of multiple species of concern in shrubland ecosystems. An important component of our analysis is to determine which anthropogenic factors or combination of features may act as barriers to vertebrate movements or dispersal.

Photo courtesy of Mike Gillingham

pgymy rabbit
Brachylagus idahoensis

Greater Sage-grouse

- **Determining how the population dynamics of wildlife are influenced by the human footprint**

The changes in habitat and predation risk associated with the human footprint may have significant impacts on the ability to maintain wildlife populations. Therefore, we need to assess the relationship between dynamics of wildlife populations and individual and cumulative features of the footprint.

- **Understanding the large-scale effects of the human footprint on migratory bird populations**

Because many bird species that breed in northwestern shrublands also winter in the southwestern United States, we can determine the relative impact of the human footprint on different periods of the annual cycle.

- **Developing models to predict the spread of invasive exotic plants accompanying the human footprint**

The linear features of the footprint provide corridors along which invasive species can spread. Further analysis of the footprint may permit better models that lead to control or slowing of invasion by exotic species. This is particularly important for shrublands in which the synergistic effects of fire and exotic plant invasion convert ecosystems dominated by native plants to systems dominated by exotic plants.

The Human Footprint: Management and Conservation Implications

The human footprint will aid managers in planning and implementing land-use actions and in developing strategies to conserve habitats and wildlife. Modeling the human footprint across large landscapes also will allow researchers to generate hypotheses about ecosystem dynamics and to conduct studies in regions differing in potential impact. Because funding for restoration and conservation projects is limited, and because there is little room for errors in the management of endangered and threatened species, land managers will be able to maximize restoration/conservation efforts in areas minimally influenced by the human footprint. As such, the human footprint model is an important first step into understanding the synergistic effects acting on shrublands in the western United States.

Credits:

Photos – USGS Researchers and the U.S. Fish and Wildlife National Image Library, except at noted.
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